



Patent  
Case No.: 59067US002

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Named Inventor: CRAWFORD, GREGORY P.  
Application No.: 10/748562 Group Art Unit: Unknown  
Filed: December 30, 2003 Examiner: Unknown  
Title: ALIGNMENT OF LIQUID CRYSTALS

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**CERTIFICATE OF MAILING**  
I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Mar. 30, 2004  
Date

  
Signed by: Tom Sanders

Dear Sir:

Pursuant to 37 CFR §§ 1.56, 1.97, and 1.98, enclosed is a completed Form PTO-1449, citing references submitted for consideration by the Examiner. Copies of any cited foreign patents, non-patent literature, and unpublished US application documents are enclosed. Pursuant to the waiver in the Pre-OG Notice, dated July 11, 2003, copies of US patents and published US patent applications are no longer required and are not enclosed. It is respectfully requested that the Examiner initial and return the enclosed Form PTO-1449 to indicate that each reference has been considered.

It is believed that no fee is due; however, in the event a fee is required, please charge the fee to Deposit Account No. 13-3723.

Respectfully submitted,

3/30/04  
Date

By:

  
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Substitute for form 1449A/PTO (modified)

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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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## U.S. Patent Documents

Exam. Init.*	Cite No.	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code (if known)			
	A1	US- 5,389,698	02-14-1995	Chigrinov et al	
	A2	US- 5,838,407	11-17-1998	Chigrinov et al	
	A3	US- 5,909,265	06-01-1999	Kim et al	
	A4	US-			
	A5	US-			

## Foreign Patent Documents

Exam. Init.*	Cite No.	Foreign Patent Document		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	Translation (Check if yes)
		Ctry. Code	Number-KindCode (If known)				
	B1						
	B2						
	B3						

## OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

Exam. Init.*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
	C1	NIKOLOVA, L. and TODOROV, T.; "Diffraction Efficiency and Selectivity of Polarization Holographic Recording", <i>Optica Acta</i> (1984); Vol. 31, No. 5; pp. 579-588
	C2	ICHIMURA, K., et al; "Reversible Change in Alignment Mode of Nematic Liquid Crystals Regulated Photochemically by 'Command Surfaces' Modified with an Azobenzene Monolayer", <i>Langmuir</i> (1988); Vol. 4; American Chemical Society; pp. 1214-1216
	C3	ICHIMURA, K., et al; "Reversible Alignment Change of Liquid Crystals Induced by Photochromic Molecular Films,...", <i>Makromol. Chem., Rapid Commun.</i> (1989); Vol. 10; pp. 5-8
	C4	GIBBONS, W.M., et al; "Surface-Mediated Alignment of Nematic Liquid Crystals with Polarized Laser Light", <i>Nature</i> (2 May 1991); Vol. 351; pp. 49-50
	C5	SCHADT, M., et al; "Surface-Induced Parallel Alignment of Liquid Crystals by Linearly Polymerized Photopolymers", <i>Jpn. Journal of Applied Physics</i> (1992); Vol. 31; pp. 2155-2164
	C6	SHANNON, P.J., et al; "Patterned Optical Properties in Photopolymerized Surface-Aligned Liquid-Crystal Films", <i>Nature</i> (7 April 1994); Vol. 368; pp. 532-533
-	C7	HASEGAWA, M., and TAIRA, Y.; "Nematic Homogeneous Alignment by Photo Depolymerization of Polyimide", <i>Conf. Record, 14th International Display Research Conference, Monterey</i> (1994); Society for Information Display, San Jose, CA; pp. 213-216

\*Examiner:

Date Considered:

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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Exam. Init.*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published
	C8	SCHADT, M., et al; "Photo-Generation of Linearly Polymerized Liquid Crystal Aligning Layers Comprising Novel, Integrated Optically Patterned Retarders and Color Filters", <i>Jpn.Journal of Applied Physics</i> (1995); Vol. 34; pp. 3240-3249
	C9	SCHADT, M., et al; "Optical Patterning of Multi-Domain Liquid-Crystal Displays with Wide Viewing Angles", <i>Nature</i> (16 May 1996); Vol. 381; pp. 212-215
	C10	KITZEROW, H.-S.; "Polymer-Dispersed and Polymer-Stabilized Chiral Liquid Crystals", <i>Liquid Crystals in Complex Geometries: Formed Polymer and Porous Networks</i> (1996); Ed. G.P. Crawford & S. Zumer; Taylor & Francis; pp. 187-219
	C11	ICHIMURA, K., et al; "Photoreactivity of Polymers with Regioisomeric Cinnamate Side Chains and Their Ability to Regulate Liquid Crystal Alignment", <i>Macromolecules</i> (1997); Vol. 30; American Chemical Society; pp. 903-911
	C12	REZNIKOV, Y., et al; "Photoalignment of Liquid Crystals by Liquid Crystals", <i>Physical Review Letters</i> (28 Feb. 2000); Vol. 84, No. 9; American Physical Society; pp. 1930-1933
	C13	KURIHARA, R., et al; "P-68: Fabrication of Defect Free FLCDs Using Photo-Alignment and Their Performance Characteristics", <i>SID 00 Digest</i> (2000); ISSN0000-0966X/00/3101-0807; pp. 807-809
	C14	LEE, B. and CLARK, N.A.; "Alignment of Liquid Crystals with Patterned Isotropic Surfaces", <i>Science</i> (30 March 2001); Vol. 291; pp. 2576-2580
	C15	IBN-ELHAJ, M. and SCHADT, M.; "Optical Polymer Thin Films with Isotropic and Anisotropic Nano-Corrugated Surface Topologies", <i>Nature</i> (12 April 2001); Vol. 410; pp. 796-799
	C16	HASEGAWA, M.; "Fabrication of Freely Patterned Aligned Nematic Liquid Crystal Cells Using UV Laser Scanning Photoalignment", <i>Jpn.Journal of Applied Physics</i> (2002); Vol. 41; pp. L201-L202
	C17	

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